A Research Proposal

On

DEVELOPMENT AND EFFECTIVENESS OF INSTRUCTIONAL MODEL IN LIFE SCIENCES BASED ON MIND BRAIN AND EDUCATION SCIENCE APPROACH IN CONGRUENCE TO THINKING PATTERN AND PARENTAL COGNITIVE STIMULATION

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INTRODUCTION

Education system of every country has its own aims and objectives. It is broadly based on the sole objective to change the behavior of learners and to develop certain skills among them, the modified behavior through learning would be helpful for the growth and development of that country on the global scenario. In India education has grown tremendously since National policy on education 1986, Programme of action 1994 has laid down some aim and objectives for imparting school education. School education has its three important components or aspects i.e. curriculum, instructions and assessment of learning outcomes.

Educational system has its backbone in the form of curriculum that is designed on the basis of certain objectives which are supposed to be achieved through instructional delivery by teachers and then assessment of these objectives is done through certain evaluation tools. In 21st century school education has undergone major radical changes due to Sarv Siksha Abhiyan and Right to Education 2009. Sarv Siksha Abhiyan and Rashtriya Madmik Siksha Abhiyan are continuously working for the quality education for both elementary and secondary school children in the country as specified by National Curriculum Framework, 2005 which emphasizes the quality of education should be ensured for achievement of objectives.

Mid-Day Meal scheme and School Health Programme are ensuring good health and nutritional status of school children in the government run schools of the country. Various grants in aids are provided for maintaining good learning environment in schools, school building are transforming into learning resources under building as learning aid scheme ,teachers are provided with information technology equipped computer labs and teaching learning materials to aid in their teaching. Computer Aided Learning project is one such project to use ICT in teaching and learning where electronic content prepared in the regional languages is provided to use by teachers. Schools are well connected with broadband internet connections to keep the pace with flow of current knowledge. The instructional objectives sought to be attained at the end of secondary stage of education have been developed by the NCERT keeping the Indian context in view are drawn from the well-

known Taxonomy of Educational Objectives, namely Bloom's Taxonomy in the Cognitive Domain; Krathwal's in the Affective Domain; and Dave's in the Psychomotor Domain. The NCERT model of classification of objectives is based primarily on Bloom's Taxonomy, as cognitive learning and outcomes form the central concern of education in our society. The NCERT model comprises of four objectives i.e. Knowledge, Understanding, Application and Skill to be attained in the core subjects of Science, Maths and Social Science, at the end of the secondary stage of education, which can be evaluated through the written examinations. (NCERT, 2004).

Teachers are supposed to focus on instructional objectives so that it could be attained by using different instructional strategies .Teacher have a significant impact on their students. The instructional strategies selected by the teachers influence student learning outcomes. Therefore teachers need to be selective in the choices they make. The theory base and research on teaching suggest that teachers serve as guide to enhance student learning. As that guide, the teacher is responsible for ensuring that the approach used to help students learn is effective in helping them achieve the intended learning outcomes .this is possible if an planned and systematic model is provided to the teachers to follow which fulfills all the needs of teachers and student which is based on research base theory and ensure intended learning outcomes in terms of set instructional objectives.

Instructional design (ID) is a general term for a family of systematic methods for planning, developing, evaluating and managing the instructional process effectively in order to promote successful learning by students (Kemp, Morrison, & Ross, 1998). The purpose of ID models is to help educators and instructional designers incorporate fundamental elements of ID principles into a manageable process (Moellem, 2001). Gros, Elen, Kerres, Merrienboer and Spector (1997) state that instructional design models have the objective to provide a link between learning theories and the practice of building instructional systems. Kemp, Morrison, and Ross (1998) stated that characteristics of learners, objectives, instructional strategies and evaluation procedures are the four fundamental elements in instructional design. Overall, Zheng and Smaldino (2003) have identified 12 instructional design elements by combining Dick and Carey (1990), Kemp, Morrison, and Ross (1994) and Smith and Ragan (1993) : Instructional goals, learner characteristics, learning context,

learning task/content, instructional objectives, selecting, instructional strategies, media and materials, assessing learning performance, resources, producing instruction and revising instruction.

The reform in Science education worldwide are derived from the constructivist views of teaching and learning. These reforms explicitly ask teachers to change their teaching strategies by shifting the emphasis from the traditional textbook-based, rote learning, to exploration, inquiry-based learning situated in real-world phenomena (National Research Council, 1996). The constructivist theory recognizes that students need to be exposed to learning experiences that enable them to construct their own knowledge and promote their thinking skills.Since long the promotion of students' thinking has been the focus of educational studies and programs (Boddy, Watson, & Aubusson, 2003; Kuhn,1999). Each of these programs has its own definition of thinking skills. Some use the phrase 'cognitive skills' (Leou et al.,2006) and others refer to 'thinking skills' (Resnick, 1987; Zohar & Dori,2003), but they all distinguish between higher- and lower-order skills. Resnick (1987) maintained that thinking skills does not have precise forms of definition; yet, higher order thinking skills can be recognized when they occur.

Higher order thinking involves application of multiple criteria, reflection, and self-regulation. Recall of information would be an example of a lower order cognitive pattern, or thinking skills, whereas analysis, evaluation, and synthesis would be considered higher order thinking skills. Indeed, learning experiences focused around analysis, evaluation, and synthesis, develop skills in problem solving, inferring, estimating, predicting, generalizing and creative thinking (Wilks, 1995), which are all considered as higher order thinking skills. Other examples of such skills include: question posing, decision making, and critical and systemic thinking (Dillon,2002; Zohar & Dori,2003)It is well established that education is our principal means of preparing students – our future citizens – for active and responsible life within our modern society . Therefore, schools at all levels should work for fostering the higher order thinking skills. Accordingly, a major purpose of science education should be the development of such skills in the context of both the specific content of science, and related disciplines. Nevertheless, it is well known that educational theories are not always implemented properly in the classroom (Boddy et al., 2003).

Different forms of thinking

Patel Rupesh(2010)outlined that the term 'thinking' is not a simple entity. It is complex in nature and so scholars in the area of thinking have identified various types of thinking. The different forms of the thinking he described areas follows:

Concrete thinking: It is the simplest form of thinking. It refers to the interpretation of sensation according to one's experiences. It is carried out on the perception of actual or concrete objects.

Abstract thinking: It is abstract thinking where one makes use of concepts, generalized ideas and language. It is superior to concrete thinking.

Critical thinking: It is the process of evaluating statements, events, arguments and experiences. It is assessing the accuracy, authenticity and validity of data. It is the judging of statements based on accepted criteria. It assesses the worth and validity of something existent. It involves precise, persistent and objective analyses.

Creative thinking: This type of thinking is associated with one's ability to create or construct something new, novel and unusual. Creativity is a special form of thinking that involves putting different elements together in order to form a coherent functional whole, which is, reorganizing elements into a new pattern or structure.

Reflective thinking: This is higher form of thinking. It aims at solving complex problems. It requires reorganization of all the relevant experiences and finding new ways of reacting. This is an insightful approach to thinking rather than trial and error. It takes all the relevant facts arranged in a logical order to arrive at a solution.

Associative thinking: This type of thinking is associated with day dreaming, fantasy, delusions, free flowing uncontrolled activities.

Convergent thinking: This type of thinking is cognitive processing of information around a common point and attempt to bring thoughts from different directions into unity or common conclusion.

Divergent thinking: This type of thinking starts from a common point and moves outward into a variety of perspectives. When fostering divergent thinking, teachers use the content as a vehicle to prompt diverse or unique thinking among students rather than arriving at a common view.

Inductive thinking: This is the process of reasoning from parts to the whole, from examples to generalizations.

Deductive thinking: This type of thinking includes reasoning from the whole to its parts,from generalizations to underlying concepts or examples.

The past two decades have provided extraordinary progress in our understanding of the nature of learning (Willis Judy, 2007). Brain sciences are discovering many things that educators have always intuitively known about learning. However, the important point is actively using this new information to improve both students learning and current teaching practices Various studies on the application of neuroscientific data in classroom instruction have been done or still in progress. Now, educators can find evidence-based neuro imaging and brain-mapping studies to determine the most effective ways to teach, as advances in technology enable people to view the working brain as it learns. In this study, the researcher discussed several studies on brain-based teaching strategies to improve students' learning.

Abbot & Ryan ,2001 in their study on brain to observe the learning patterns of the activity on a computer screen .They have found that the brain reshapes itself according to the usage on non-usage. They ascertain that, "Humans are predisposed to learn from and adapt to their environment". Changes in the brain generally occur as a function of use of the brain. In other words the brain continuously adapts to its environment. Research on plasticity in an another significant finding of brain sciences , Brain plasticity, the ability of brain structure and organization to change based on demands and experience, is retained throughout our lives (Maguire et al,2000) studies on recovery from brain damage are

relevant to quote for plasticity of brain . Immordino-Yang (2008) presents findings from 2 boys, Nico and Brooke, each of whom lost half of his brain. The remarkable recovery of functions in the two boys highlights the degree to which children' s emotional and social experiences shape brain development, as well as the importance of plasticity.

Gias,et.al(2006) In an experiment on high school students ability to remember vocabulary it has been found that declarative memory is enhanced when sleep follows within a few hours of learning, independent of time of day, and with equal amounts of interference during retention intervals.

The aspects of learning, prior knowledge and experience have a solid basis in research on learning. There is widespread agreement that prior knowledge influences learning, and that learners construct concepts from prior knowledge (Resnick, 1983) more recent research findings have shown that the ability to relate new information to prior knowledge is critical for learning. It is not possible for someone to understand, remember or learn something that is completely unfamiliar. Some prior knowledge is necessary to understand the task at hand. But having the prerequisite prior knowledge is still not sufficient to ensure adequate results. People must activate their prior knowledge in order to be able to use it for understanding and for learning. Research shows that students do not consistently see the relationships between new material that they read and what they already know. Research also shows that learning is enhanced when teacher pay close attention to the prior knowledge of the learner and use this knowledge as the starting point for instruction. (Bransford, Brown & Cocking, 1999.)

Coward (1990) The brain innately seeks meaning through seeking patterns. The patterns give context to information that may otherwise be discarded as meaningless. Freeman (1995) suggests that it is the making of familiar connections (relevance) and the locating of conforming neural networks (pattern making) that are critical to the formation of meaning. For younger children, learning that is hands-on, experiential and relevant enables patterns to develop. Relevance helps children to make personal connections between what they already know and the work they do in class. Relevance can be created through linking

with prior learning and experiences, and context and pattern making may result from the use of universal concepts and core organizing principles (Jensen 1998).

Diamond (1988) Experience has been found to affect the physical structure of the brain, a phenomenon known as plasticity. The brain grows new connections with environmental stimulation and modifies itself structurally depending on the amount and type of usage (Healy 1990). Each new stimulation and experience rewires the brain. Enriched environments enable the brain to grow more neural connections, thickening the cortex of the brain, while less stimulating environments actually have a thinning effect on the cortex (Diamond and Hopson 1998). Enriched environments provide challenge by including reading and language, motor stimulation, a focus on the arts, stimulating surroundings, and a wide variety of approaches to thinking and problem solving. Exposing children to a variety of problem solving approaches acknowledges the complexity of the brain. Children should be encouraged to explore alternative thinking, multiple answers and creative insights. Because experience structurally changes the brain, the more we learn, the more unique our brains become. Neural pathways that help us to excel at thinking skills are very specific and while a student may succeed at one type of thinking, she may have difficulty with another.

LeDoux (1994) Emotions drive attention, create meaning, and have their own memory pathways it cannot be separated from learning, and in fact, may drive learning. Emotions help us make better value-based decisions as all values are emotional states. Emotions generate and drive the execution of our goals and plans (Freeman 1995). Chemicals activated by emotions help us recall things better thereby affecting long-term memory. When emotions are engaged the brain learns fastest and easiest during the early school years.

Research shows that there are major developmental differences in learning. As children develop, they form new ways of representing the world and they also change the processes and strategies they use to manipulate these representations. In addition, there are important individual differences in learning. Developmental psychologist Howard Gardner has argued that there are many dimensions of human intelligence other than the logical and linguistic skills that are usually valued in most school environments. Some children are

gifted in music, others have exceptional spatial skills (architects and artists), or bodily/kinesthetic abilities (athletes), or abilities to relate to other people, etc. Schools must create the best environment for the development of children taking into consideration such individual differences.(Case, 1978;Gardner, 1993.) A study posited (Bonnema, 2009) that learning is enhanced with brain based research. This study discusses brain-based learning principles and its relation to classroom instructions.

A rapidly growing quantity of research currently exists regarding how the brain perceives, processes, and ultimately learns new information. In order to maximize their teaching efficacy, educators should have a basic understanding of key memory functions in the brain, and how these functions relate to student learning.(Sousa,2006)

Laughbaum, (2008) conducted a study about the implications of neuroscientific research on teaching algebra. This study makes an argument that algebra should be taught through functional approach implemented with a graphing calculator so that one can seamlessly capitalize on the brains normal functioning. Laughbaum, (2010),In teaching algebra one should strongly consider functional approach with tools such as, cognition, neural process of association, pattern recognition, attention, visualization and enriched class room environment.

Schiller, et.al (2008) examined a study using brain-based teaching strategies to create supportive early childhood environments that address learning standard's. The researcher remind teachers that standards are not intended to fence in creative teachers or become obstacles for learners with special needs. To help teachers optimize learning for all children, they review brained-based research findings, such as, the importance of safe environments, the effect of emotions on learning, the use of multisensory practices and differentiated teaching practice, the process of sense making, and the importance of planning for meeting special needs.

Kennedy, and Teresa,(2006) The implications of neuroscience for educational reform regarding second language (L2) learning can clearly be seen in the various categories such as brain structures and the corpus callosum; neuronal development and the parts of the brain dedicated to language; the brain plasticity theory and language mapping; memory and the

Information Processing Model; and of course, developing and utilizing a brain-compatible language curriculum that is meaningfully integrated into the basic content areas covered in all grade levels from Pre K to grade 12. The study was designed to address relationships between the corpus callosum and bilingual capacity, and provides recommendations to language teachers regarding brain-based learning through content-based language teaching.

Geake and Cooper (2002) proposed a study of adaptive plasticity that relies on stimulus reinforcement and examine possible implications for pedagogy and curriculum depth, the relationship to school learning with more recent cognitive neuroscience, Cognitive neuroscience may be able to open the lid just a little to have a glimpse inside the mind. Such insights may, in turn, be helpful in either supporting long-regarded best educational practice, or in deciding between competing cognitive models and their use in educational settings. Cognitive neurosciences advances our understanding of the very basics of learning, so there is a need for educationists to appropriate this research with regard to implication and applications for teaching in formal educational settings especially school classrooms.

Caine and Caine (2002) defined brain based learning as recognition of the brains code for meaningful learning and adjusting the teaching process in relation to those codes. Studies in the field of neurobiology have improved understanding of how brain functions and how learning is formed. Educators who work in collaboration with neurobiologist integrate knowledge of the function of the brain and adapt than to the learning principles. Brain based learning aim to enhance the learning potential and in contrast to the traditional approaches and models provides a teaching and learning framework for educators.

Research into the functioning of the human brain, particularly during the past decade, has greatly enhanced our understanding of cognitive behaviors' which are fundamental to education: learning, memory, intelligence, and emotion. Cognitive neuroscience to educational futures might provide a means for teachers to reclaim eroded professional autonomy (William & Eric C,2003;Johnson & Hallgarten, 2002). cognitive neuroscience literature, have provided several informed suggestions about the areas of educational practice where the interface between what we know about neuroscience and the

brain might be incorporated into effective classroom learning techniques.

When the child is born he is able to see and the signals are received on visual cortex where synaptic density (nerve connections) increases which is at peak at 10 months of age. After that pruning process (shunting of extra connections) starts and decline in synaptic density starts until it stabilizes at the age of 10 years and remains at this level throughout adult life .Different parts of the human brain mature at different times (Bruer, 1997; Hall, 2005). it cannot be assumed that synaptic excess indicates a critical period for learning. In humans, synaptic density correlates to the emergence of skills and capacities, not to the best function of these skills and capacities. Although Neuroscience denies the critical periods in learning as a neuromyth but it accepts that there are some sensitive periods to learning is fast during that period of life(Wolfe,2006)

Neuroscience in education which brings the learning system of brain forward often called brain based learning which takes into consideration how brain takes, processes, interprets information; makes connection, stores (like making connection, coding, constructing matrix), and remembers the messages (Greenleaf, 2003). it is student centered learning that utilizes the whole brain and recognizes that not all students learn in the same way. It is also an active process where students are actively engaged in constructing their own knowledge in a variety of learning situations and contexts (Caine & Caine, 1994, 1997; Caine & Caine and Crowell, 1999). Brain based learning involves accepting the rules of how the brain processes, and then organizing instruction bearing these rules in mind to achieve meaningful learning (Caine and Caine, 1994).. It is a set of principles and a base of knowledge and skills through which we can make better decisions about the learning process (Jensen, 2000)Although neuroscience does not directly deal with teaching but successful learning is the result of success in teaching(Goswami,2006)

Teaching is generally considered an activity which is designed and performed for multiple objective in termed changes in pupil behavior, pupil on the other hand have multidimensional Personalities having different learning styles. Contemporary conceptions of instructional strategies acknowledge that the goals of schooling are complex and multifaceted, and that teachers need many approaches to meet varied learner outcomes for

diverse populations of students. A single method is no longer adequate. Effective teachers select varied instructional strategies that accomplish varied learner outcomes that are both behavioral and cognitive. In teaching the use of model is very old. Socrates, the Greek Philosopher used his own model of question answer (dialect), Indian ancient teacher developed their own model of teaching to affect the desirable changes in the behavior of the learners.

Several model of teaching have been developed in the last two decades in the western countries. These models prescribe different approaches to instructional process to bring changes in the behavior of the learners. The common implication of these facts is that teacher should use different strategies of teaching which match the objective of teaching on one hand and on the other hand with pupils learning styles and personality dimensions. The instructions should be designed by making use of prevalent theories and theoretical knowledge into different models of teaching which can be readily used by teachers in schools as well as school settings.

Caine and Caine(1994) have already defined Principals of Brain Based learning like Learning engages the entire physiology, The search for meaning is innate, The search for meaning occurs through patterning Emotions are critical to patterning, Every brain simultaneously perceives and creates parts and wholes, Learning involves both focused attention and peripheral attention, Learning always involves conscious and unconscious processes, We have at least two types of memory systems: spatial and rote learning. The brain understands and remembers best when facts and skills are embedded in natural spatial memory, Learning is enhanced by challenge and inhibited by threat, Every brain is unique. Caine and Caine have also given three phases to implement into classroom practices i.e. Relaxed Alertness, Orchestered Immersion and Active Processing.

Ozden & Gultekin (2004-2005) Conducted an experimental study to assess the effects of these brain based learning principles on academic achievement and retention in science course. It was found that brain based learning approach appears to be more effective than the traditional teaching procedures in science course in terms of enhancing the retained knowledge.

Duman (2006) A study conducted on the brain based learning. The purpose of study is to compare social studies instruction based on the brain-based instruction (BBI) and traditional teacher-centered method, and to search the effects of BBI on elementary school sixth grade in social studies instruction students' academic achievement and motivation. It is concluded on comparing experiment group (class B and C) students' academic achievement point which was studied with BBL with the control group (class A) students' academic achievement points, there is a significant difference exists

Wortock (2002) indicated that the web-based teaching procedures designed in accordance with the principles of the brain-based learning approach were very effective in enhancing the students' achievement.

When the world is looking at brain sciences to inform education the role of psychology can not be denied hence to have an interdisciplinary dialogue a relatively new field called Mind Brain and Education Science has came into existence which combines the best practices based on evidences to inform the educational process it is also called the new brain based teaching by Tokuhama (2008) who in a study in the development of standards in the new academic field of mind brain and education science through ground theory supported by meta-analysis of the entire literature available in the field under study proposed ten instructional guidelines after defining different principals and tenets in the field of Mind Brain and Education Science which according to her is the new brain based teaching.

The gap between the field of education neuroscience and psychology is to be filled by a establishing a common vocabulary and creating framework for the interflow of information in these parent fields ,that is done by the advent of the new field of Mind, Brain, and Education (MBE) sometimes called educational neuroscience or Neuroeducation. It is posited as a mediator between neuroscience, psychology and education (Tokhuhama ,2008).Many researchers who does not support the direct application of brain research findings into classroom practices as they consider it as too early to apply the basic research into education rather they support an multidisciplinary endeavor where flow of information from brain research to psychology to education should occur (Bruer J.T, 1997),they would

agree with the new field of Mind Brain and Education(MBE) science which is one such endeavor to bridge the gap in neuroscience psychology and education.

In this study, researcher surveys current literature to identify foundational instructional strategies that are supported by MBE science to devise an instructional model in life sciences. This study discusses new brain-based learning or mind brain and education science and its relation to classroom instructions This interdisciplinary endeavor will allow for a better understanding of how people oversimplification or inappropriate interpretation of complex neuroscience research is widespread among curricula claiming that brain-based approaches are effective for improved learning and retention.

We have outlined the major characteristic of MBE based approach into two groups which were highlighted in the research of these fields i.e. Physiological Characteristics and Instructional characteristics. Physiological Characteristics are linked with the physiological system such as sleep, nutritional status, health status and stress free environment. Instructional Characteristics are that mind and brain is social, feelings and emotions have its role to play in learning, and immediate feedback enhances learning, priming of brain, learning in social contexts is best. There are different memory system and importance of brain plasticity.

Teacher is the base of an educational system, although our system is to provide child centered education but it is the teacher who coordinates the flow of information and assess the learning outcomes. Hence there is a strong need to work on the part of instructions delivered by teachers. As every learning has a base in Brain or learning is always Brain Based. Brain is even the major organ of control and for learning to happen affectively we cannot ignore the role of Brain in learning, There is a great deal of information in the literature about effective schools using brain-based learning techniques to enhance learning outcomes (e.g., Caine & Caine, 1995; Freeman, 2000). Effective schools using brain-based learning span the United States and Canada.

Prasart Nuangchalerm (2010) in his study on the development of an instructional model for brain-based learning for science by using knowledge of the brain processes . Delphi method was employed with 18 panel members. The instructional model (PRADA-

Preparation, Relaxation, Action, Discussion, and Application)was outlined, The BSCS (Biological Science Curriculum study) has developed its instructional model called 5E on the basis of research by scientists and quality research based book on How people Learn: Brain Mind experience and School(Bransford D, Brown L, and Rodney R. Cocking ,2000), it has five phases called Engagement, Exploration Explanation Elaboration And Evaluation.

Highly effective Teaching (HET) Model originally developed by Susan J. Kovalik as the ITI (Integrated Thematic Instruction) Model and continually updated to the Highly Effective Teaching Model is currently used in hundreds of school districts across the United States and locations throughout the world. Regardless of the language, culture, ethnicity, or socioeconomic status of the student community, its outcomes are shown quantum leaps in student achievement and a lifelong love of learning. It provides a way of conceptualizing the orchestration of a Body brain-Compatible learning environment by implementing the science of learning (how the brain learns) and its implications within the classroom for school wide improvement.

Despite the decade of the brain in the 1990s, and years of educators striving to adopt evidence based practice, it is clear that brain science is the driving force behind improving education practices. The era of brain-based pedagogy should be supplanted by a richer, interdisciplinary dialogue aimed at understanding and reshaping the study of learning. The time is now to forge strong alliances between the brain sciences and education to work to inform best practices at school, home, and in the community (Fischer et.al 2009). Innovations in technology, imaging and other brain science research tools enable us to bring additional information to share with social science and behavioral science to create a fuller picture. The interdisciplinary and inter-institutional nature of this work is both exciting and essential for developing real solutions to educational issues.

SCOPE OF STUDY

Teachers are often free to choose the pedagogy to teach, The whole teaching process is based on inquiry and exploratory where the brain plays a prominent role. MBE science can now explain meaningful links between concepts that are learnt and their application in real life situation. Such links will strengthen their neural connections and integrate incoming

information and experience in their existing wiring. Educators and scientists have long known that teaching, learning, and brain function are intricately connected. But until recently, the fields of education and neuroscience have remained isolated in the classroom and lab, respectively, with only sporadic attempts to find opportunities for strategic cooperation. Many areas of neuroscience are already producing research findings that could provide ideas to improve teaching methods and curricula. Studies of memory formation and retrieval suggest testing is important for learning. Keeping the neuro-scientific research findings in full view, an attempt is proposed through this study to design and develop an Instructional model for teachers to get innovative pedagogy for teaching .

The major Paradigm shift in recent years in our education system, which is neuroscience research application in education .researchers around the world are working on developing an interdisciplinary field into existence the applications of which would be useful for teaching and learning. The field is educational neuroscience, neuroeducation and now mind brain and education science. The lead role in this is being played by Harvard Graduate School of Education, Dana Foundation, Society for Neuroscience (SfN),John Hopkins University, and Cambridge Centre For Neuroscience In Education., The body of knowledge being growing in this stream, we should also use the findings in this field to improve our teaching and learning process for the betterment of learning and achieving the aims of education.

Immordino-Yang,(2011) at the Brain and Creativity Institute and Rossier School of Education at the University of Southern California, is committed to bringing neuroscientific evidence to inform educational theory and practice. While there is agreement that multidisciplinary collaboration is needed, Kurt Fischer(2009) at Harvard University Graduate School in Education, proposed a model for the training of a new generation of educational researchers and practitioners in neuroscience .They present the idea of research school collaborations as the model of choice for Mind, Brain, and Education. They argue that research school collaborations embody the methodological innovations necessary to build a functional interdisciplinary research group.

It would seem unwise not to think about the ways in which the cutting edge science of learning (which includes neuroscience) could exert its effects on education. We owe it to our children to find the best ways to teach and to systematically compare educational approaches, rather than simply going with what seems to work. This would make sense for educators to know more about the workings of the organ that supports their students' learning and it would facilitate their understanding and guard them against preconceptions and scientifically unfounded assumptions about the brain and learning.

In India SSA and RMSA are continuously working for universalization of education, in SSA framework for implementation based on right to education act2009 it has outlined many aspects of imparting quality education among which it has been the space for innovation in pedagogy like 'Nali Kali' programme of Karnataka ,the activity based learning programme of Tamil Naidu. The Hoshangabad Science Teaching Programmme by Eklavaya,and 'Parho Punjab' project for primary school children in Punjab. All these are some pedagogical approaches away from traditional teaching methods. The success of these innovations in some way shows us the way to do more research in pedagogy.

Mind Brain and Education Science challenges current teaching practices and calls for a reality check on beliefs about the teaching-learning process, especially as they relate to brain-based education. Teacher's application of scientifically based information about the brain and a common set of standards guiding them can potentially shape a new conceptual framework for educational best practice in the future. The premises, principles and instructional guidelines behind Mind Brain and Education Science point to one of the most important paradigm shifts in education this generation.

In the present study of development of Instructional Model for life science we are going to do research in quality improvement of the instructional process. India is looking forward to accept the change in its pedagogical approach.. Zee network's Zee learning has taken lead in integrating brain based teaching in their chain of Schools named as Mount Litera schools the programme is called 'BRAIN CAFÉ', Zee schools have tied up with Gakken Education Co. (Japan) to offer Brain CafE Science classes in India. This is an integrated eight level concept builder program for students of class I to VIII. The programs

shall run in schools as supplement to the regular curriculum and would bring better understanding and appreciation of the world of Science. "Observe, Explore and Reflect" is the basic instructional strategy of such programme. Although many areas of brain-based learning still need more research, but dozens of studies are clear and solid enough to be transformed into classroom practice (Jensen, 2005). Although some work on these lines have been initiated but we need to explore the field more to develop a strong research base in new science of learning i.e.the Mind Brain and Education Science.

The proposed study is not merely the Development of an Instructional model instead the study is designed to influence our existing knowledge of learning in devising innovative pedagogical approach for students and helpful in solving various classroom problems and thus make the teaching-learning process more meaningful and application oriented. Attempt is being made to bridge the existing gap in cognitive neuroscience research, brain-based learning and their implications in the field of education.

OBJECTIVES OF THE STUDY

1. To develop an Instructional model for life sciences based on Mind Brain and Education Science approach.

2. To find out the effectiveness of Instructional model for life sciences based on Mind Brain and Education Science approach in congruence to the thinking pattern.

3. To find out the effectiveness of Instructional model for life sciences based on Mind Brain and Education Science approach in congruence to parental cognitive stimulation.

STATEMENT OF THE PROBLEM

The present study is entitled as:

"DEVELOPMENT AND EFFECTIVENESS OF INSTRUCTIONAL MODEL IN LIFE SCIENCE BASED ON MIND BRAIN AND EDUCATION SCIENCE APPROACH IN CONGRURENCE TO THINKING PATTERN AND PARENTAL COGNITIVE STIMULATION"

Attempt would be made to develop an instructional model on MBE principals,Tenets and guidelines (Tokuhama 2008) and effectiveness of this model would be measured on secondary level students.

OPERATIONAL DEFINATIONS OF THE TERMS

The Different Terms used In the present study have been defined below:

Instructional Model: It is the sequence of steps and activities done in the process of teaching by the teacher. Instructional Model is prepared for the providing guidance to the teachers in designing their teaching practices. Instructional process and its sequence of activities undertaken by the teachers based on the research findings and principals and guidelines of brain research .The Mind Brain and education science discipline would be providing insights and theoretical base for the development of the Instructional Model.)

Mind Brain And Education Science(MBE):It is the new discipline of study and the interdisciplinary field between Education ,Educational psychology and Cognitive Neuroscience. The MBE science is the new science of learning and innovative way to consider old problems in education with best possible evidence based solutions for the classroom.(Tokhuhama ,2011)

Thinking pattern: It is the process of mind which reflect the individual's thought process. Thinking is the highest mental activity present in man. All human achievements and progress are simply the products of thought. The evolution of culture, art, literature, science and technology are all the results of thinking.Thought and action are inseparable - they are actually the two sides of the same coin. All our deliberate action starts from our deliberate thinking. For a man to do something, he should first see it in his *mind's eye* -- he should imagine it, think about it first, before he can do it.

Thinking patteren of the individual reflects its thinking skills. Thinking skills vary by order from higher order thinking skills like reasoning ,problem solving ,decision making etc. to lower order thinking skills.

Parental Cognitive Stimulation: The term parental cognitive stimulation here implies the conditions provided to a child by his parents that may include the home environment, their values, parental attitude and behavior towards their ward. It would stimulate the mind of the child for better learning.

Life Sciences: life science is the sub disciplines of science which is related to the life related processes and functions of the living organisms it include many fields like botany, zoology, microbiology, biochemistry, human genetics etc.

RESEARCH QUESTIONS

1. Why there is a need to develop Insructional model for life sciences based on Mind Brain and Education Science approach?

2. How Instructional Model for life sciences based on Mind Brain and Education Science approach is effective in influencing the thinking pattern?

3. How parental Cognitive Stimulation is contributing to the effectiveness of Instructional model for life sciences based on Mind Brain and Education Science approach?

METHODOLOGY OF RESEARCH

4.1 Research method

In the present study of Development and effectiveness of Instructional model .single method would not be sufficient a mixed method of research would be used i.e. both qualitative and quantitative methods would be used .Different steps have been outlined as given below.

Step 1:

Review of Brain Based Research findings and work done in the related field.

Step 2:

Development of an instructional Model based on the guidelines and findings of research by some neuroeducationists and taking guidance from the experts of MBE.

Step 3

Creating teachers manual cum module for life science subject based on the instructional model.

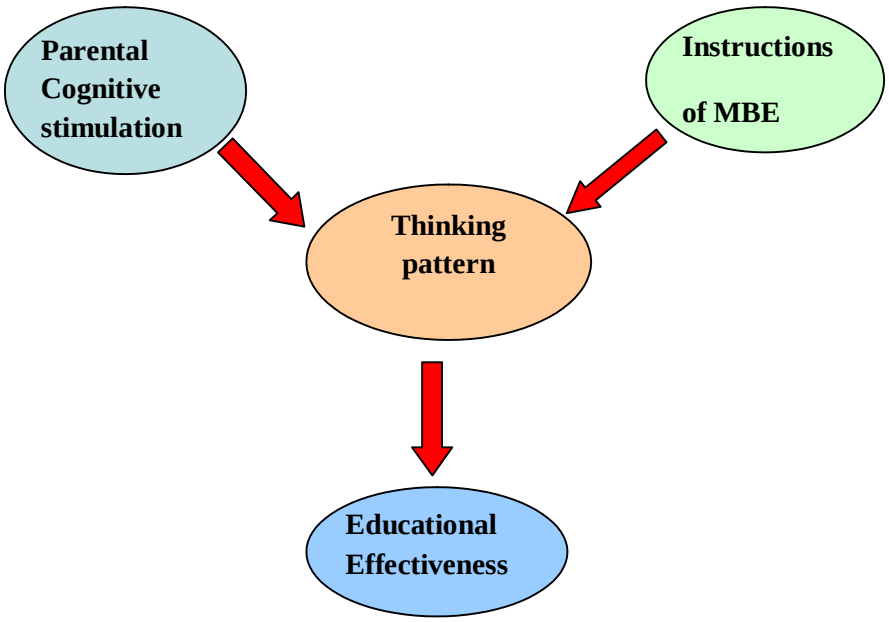
Step 4

Application of developed Instructional Model into the secondary classrooms.

Step5

Assessment and evaluation of learning by teaching through this model and its comparison with controls and interpretation of results to establish the effectiveness of MBE based Instructional model in terms of Thinking pattern and its validation on the basis of Parental Cognitive Stimulation.

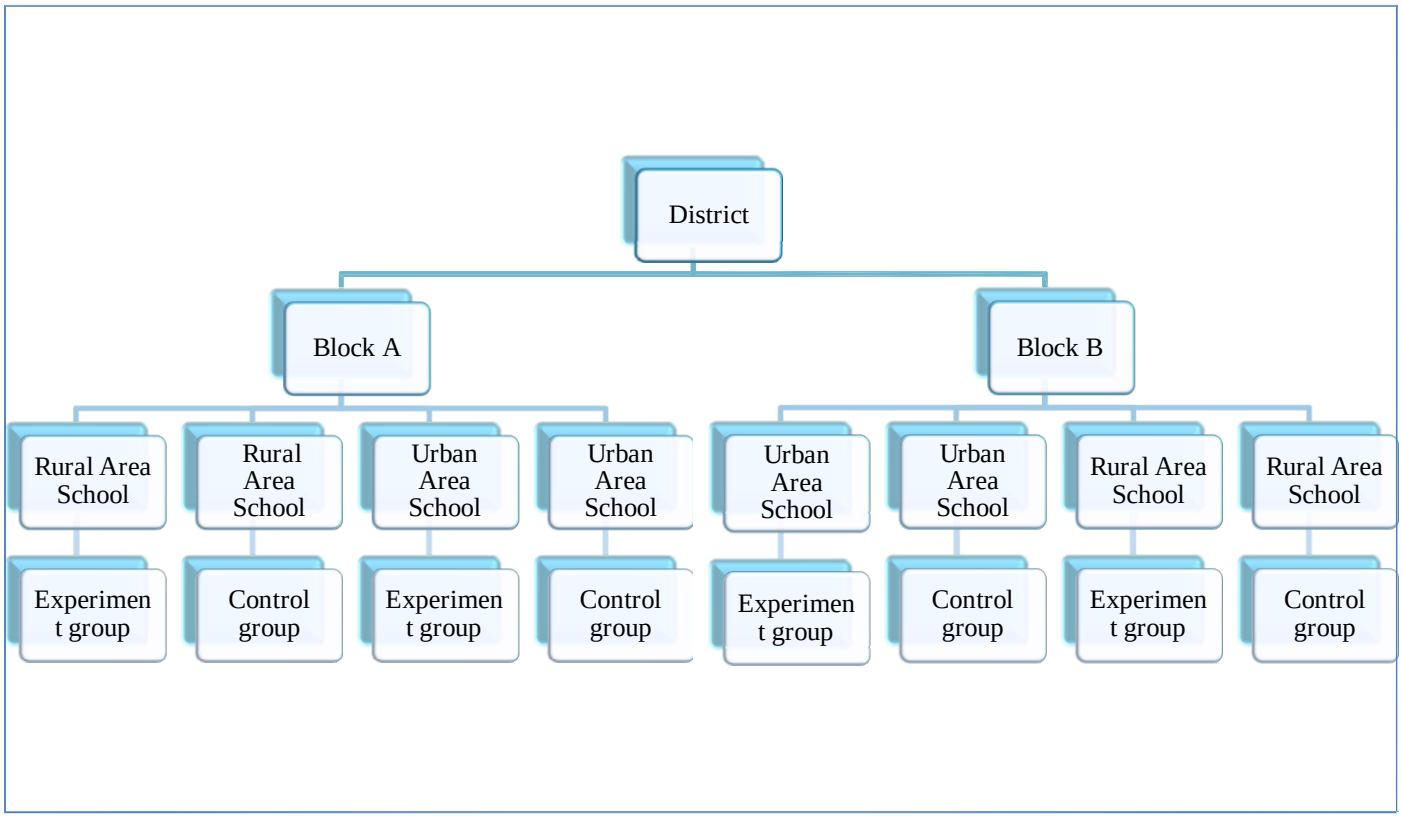
4.2 Tools to be used



- For finding the cognitive stimulation the scale developed by Dr.S.K.Bawa and Ms. Husanpreet Kaur would be used by the researcher.
- To study the thinking pattern, a scale will be developed by the researcher.

4.3 Sample Design

Random sampling would be used for selection of schools and single intact class would be selected ,the syllabus of PSEB (Punjab school Education Board) the content of books and teaching learning materials and facilities provided by schools would be used for instructional model based teaching.



The effectiveness of instructional model would be monitored and evaluated on the basis of application of this model in the life science classrooms, for which total N=300 students would be part of sample.

The study will be conducted in Bathinda District of Punjab. Two blocks will be selected for the study. four schools be selected from each block to make a total sample of eight schools. Out of four schools from each block two schools would be from rural and urban area each, out of two schools from urban area one school will form the experiment group whereas the other school will be selected as control group. Similarly out of two rural schools selected under each block one school will form the experiment and other will form the control group. The study would involve the Ninth standard of the selected schools .

4.4 Delimitations of study

Present study would be delimited to secondary level science of ninth standard and to the Bathinda district only. Curriculum and content of PSEB would be used for delivery of instructions based on Instructional model for life sciences based on Mind Brain and Education Science approach.

4.5 Data analysis

Appropriate statistical techniques would be used to evaluate, analyse and interpret the data.

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